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June 13, 1839.

JOHN W. LUBBOCK, Esq., V.P. and Treas., in the Chair.

The ballot for Edwin Guest, Esq., was postponed in consequence of the number of Fellows required by the Charter not being present.

The following papers were read, viz. :—

“Researches on the Tides. Tenth Series. On the Laws of Low Water at the Port of Plymouth, and on the permanency of mean water.” By the Rev. W. Whewell, B.D., F.R.S., Fellow of Trinity College, Cambridge.

In this memoir the author investigates the question, how far the *mean water*, that is the height of the tide midway between high and low water, is permanent during the changes which high and low water undergo. That it is so approximately at Plymouth having been already ascertained by short series of observations, it was desirable to determine the real amount of this permanency by induction from longer series of observations. A period of six years was chosen for that purpose; and the method of discussing these observations was the same, with slight modifications, as in former researches.

The height of low water, cleared from the effects of lunar parallax, and very nearly so from those of lunar declination, and compared with the height of high water, similarly cleared, enabled the author to ascertain whether the mean water also was affected by the semi-menstrual inequality. The results of the calculation show that the height of mean water is, within two or three inches, constant from year to year: and that, for each fortnight, it has a semi-menstrual inequality amounting to six or seven inches;—the height being greatest when the transit is at 6h. and least when at 11 h.,—the immediate cause of this inequality being, that the semi-menstrual inequality of low water is greater than that of high water: this inequality, however, is probably modified by local circumstances.

These researches have also verified the theoretical deduction, that the height both of low and of high water being affected by the moon's declination, their mean height partakes of the variations in this latter element, in successive years, consequent on the change of position of the moon's orbit. At Plymouth the increase in mean low water amounts to about two inches for each degree of increase in the declination. In the high water this change is less marked.

The parallax correction of the height of low water is obtained from all years alike, by taking the residue of each observation, which remains when the semi-menstrual inequality is taken away, and arranging these residues, for each hour of transit, according to the parallax. The declination correction is obtained in a manner analogous to the parallax correction, from each year's observations, with some correction for the variation in the mean declination of the moon in each year.

“Researches on the Tides. Eleventh Series. On certain Tide